Claims

1. Method for conversion of waveguide modes from a mode of type TM_{01} to mode of type TE_{11} for transmission of power within the microwave range, characterized in that incoming power of mode type TM_{01} is divided between two or more waveguides with cross-sections essentially in the shape of circle sectors, in that the divided power is phase-shifted by the waveguides in a subsequent phase-shift section by means of waveguides with cross-sections essentially in the shape of circle sectors being designed with different radii, after which the waveguides are changed into a common essentially circular waveguide that emits an outgoing power of mode type TE_{11}.

2. Method according to Claim 1, characterized in that the conversion of the waveguide mode from mode type TM_{01} to mode type TE_{11} is caused, in an intermediate stage comprising four separate waveguides, to assume a field configuration for the basic modes of the respective waveguides that constitutes one quarter of a so-called TE_{21} mode in a corresponding circular waveguide.

3. Mode-converting arrangement for conversion of waveguide modes from a mode of type TM_{01} to mode of type TE_{11} for transmission of power within the microwave range, comprising an incoming waveguide for reception of power of the type TM_{01}, an outgoing waveguide for outputting power of the mode type TE_{11} and a waveguide-mode-converting section arranged between the incoming and outgoing waveguides, characterized in that the waveguide-mode-converting section comprises at least one input section for dividing the received power into two or more components and a phase-shift section at the output side of the input section with an allocated waveguide for each power component, with the waveguides being designed with cross-sections that are essentially

in the shape of circle sectors with different radii emanating from a common centre and such that the cross-sections in the shape of circle sectors together essentially cover 360 degrees.

4. Mode-converting arrangement according to Claim 3, characterized in that the phase-shift section is dimensioned to have a length in the transmission direction of at least $\lambda_0/4$ and, for example, of the order of $2\lambda_0$, where λ_0 denotes the free-space wavelength of the centre frequency in the band that is transmitted by the arrangement.

5. Mode-converting arrangement according to any one of Claims 3-4, characterized in that a mode-mixer section is included in connection with the outgoing waveguide, which mode-mixer section comprises a change from a plurality of waveguides with cross-sections in the shape of circle sectors to one waveguide with an essentially circular cross-section.

6. Mode-converting arrangement according to Claim 5, characterized in that the change in the mode-mixer section can be designed to be abrupt.

7. Mode-converting arrangement according to Claim 5, characterized in that the change in the mode-mixer section is designed to be gradual, by the change having an extent in the transmission direction that corresponds to at least $\lambda_0/4$, where λ_0 denotes the free-space wavelength for the centre frequency in the band that is transmitted by the arrangement.

8. Mode-converting arrangement according to any one of Claims 5-7, characterized in that the output of the mode-mixer section forms the outgoing waveguide of the arrangement.

9. Mode-converting arrangement according to any one of the preceding Claims 3-8, characterized in that a balance section is included, connected to the output side of the phase-shift section and comprising waveguides with cross-sections that are essentially in the shape of circle sectors with the same radii, in order to balance the field configurations of the waves that leave the different waveguides of the phase-shift section.

10. Mode-converting arrangement according to any one of the preceding Claims 3-9, characterized in that an intermediate section is arranged between the input section and the phase-shift section, which intermediate section comprises a plurality of waveguides with cross-sections in the shape of circle sectors and essentially identical radii.

11. Mode-converting arrangement according to any one of the preceding Claims 3-10, characterized in that the input section is designed to divide the received power into two components.

12. Mode-converting arrangement according to any one of the preceding Claims 3-11, characterized in that the input section is designed to divide the received power into four components.

13. Mode-converting arrangement according to any one of the preceding Claims 3-12, characterized in that the input section comprises thin ridges for dividing the received power, which ridges increase in size in the transmission direction from the periphery of the input section inwards towards the middle of the input section so that they meet at the output side of the input section.

14. Mode-converting arrangement according to Claim 13, characterized in that the ridges are designed to increase in size continuously in the transmission direction.

15. Mode-converting arrangement according to Claim 13, characterized in that the ridges are designed to increase in size in steps in the transmission direction.

16. Antenna arrangement comprising a mode-converting arrangement according to any one of Claims 3-15.